

**Measuring Sustainability Competencies in Transforming A'o, a Multi-faceted,
Transdisciplinary Professional Development Experience**

By

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Abstract

This project looked at evidence of sustainability competencies in the context of a multi-disciplinary, experiential learning experience called Transforming A'o (teaching, learning) for faculty at Punahou School in Honolulu, Hawaii. This professional development employed a Problem-based Learning (PBL) approach with a Ke 'Ike Hawaii (ways of knowing) lens, to further Punahou sustainability education goals.

Using the conceptual frame of sustainability competencies as defined by Lans et al. (2014), participants completed a self-report survey before and after the learning experience. Focus groups allowed participants to reflect on what made various elements of the training impactful. In addition, 5-month follow-up interviews and artifact analysis provided insight into the connections participants found between PBL, Ke 'ike Hawaii, and sustainability.

Sustainability competencies could be evidenced in surveys and project descriptions. However, participants were less likely to make explicit connections to sustainability in interviews, compared with PBL and Ke 'Ike Hawaii. Recommendations focus on decreasing complexity, creating community, and making connections.

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Executive Summary

Organization Context

Punahou school is a K-12 independent college preparatory school located in Honolulu, Hawaii. Since its founding in 1841, Punahou has grown into a large, complex organization serving 3,7000 students across two divisions: the Junior School (K-8) and the Academy (9-12). It is a large, complex organization with nearly 500 faculty and staff. The school has recently renewed its Mission and Values statements for the first time in 37 years. As a part of that effort, the school's president has laid out five strategic initiatives:

1. Inquiry-led, lifelong learning
2. Social, emotional, and ethical learning
3. Diversity, equity, inclusion, and belonging
4. Student safety and well-being
5. Sustainability

The new Director of Sustainability, Debbie Millikan, partnered with me to better understand how we can measure sustainability education at Punahou to advance programmatic goals.

Problem of Practice

A newly created professional development experience offered an opportunity to pilot measurement tools. At the behest of the president, faculty members designed a place-based, immersive professional development retreat called Transforming A'o (teaching/learning). This experience was framed through a Problem-Based Learning (PBL) lens to develop faculty understanding of Ke 'Ike Hawaii (indigenous wisdom), inquiry-led learning, and sustainability. At the end of the experience, faculty participants produced a project that they could implement with students.

This transdisciplinary approach to advance overlapping strategic priorities offers an opportunity to test whether it's possible to capture growth in sustainability education measures. Using a conceptual frame of sustainability competencies, as laid out by Lans et. al (2014), we tracked evidence of growth using a mixed-methods approach that included self-report surveys, focus groups, follow-up interviews, and artifact analysis of project descriptions. Additional questions explored how sustainability initiatives could benefit from successful framing of Ke 'Ike Hawaii and PBL initiatives.

Project Questions

- 1) What impact does Transforming A'o training have on participant sustainability competencies?
- 2) How do participants value distinct elements of Transforming A'o training?
- 3) What connections do participants make between Ke 'Ike Hawaii, sustainability, and PBL after going through the training?

Methods

To answer these investigation questions, the following data were collected:

- Pre-training surveys (Q1) based on Lans et. al. (2014) sustainability competency survey
- Focus group interviews (Q2) to elicit free-response discussion around training elements
- Post-training surveys (Q1) based on Lans et. al. (2014) sustainability competency survey
- Follow-up interviews (Q2 & Q3) to triangulate lasting impact of Transforming A'o
- Artifact analysis of project descriptions (Q1, Q3) to triangulate results

Findings

Finding one: Participant sustainability competencies increased after participation in transforming A'o training.

This was evidenced by significant increases in self-report measures across all competencies. Artifact analysis of project descriptions also unearthed evidence of sustainability competencies in action.

Finding two: Participants valued elements of Transforming A'o that developed community and decreased complexity.

Punahou is a large and complex organization; participants endorsed activities and tools that made learning and teaching simpler. Transforming A'o elements were more likely to be rated as impactful when they developed community by bringing together people from different corners of campus.

Finding three: Participants made connections between Ke 'Ike Hawaii, PBL, and their workspaces, but they were less likely to report connections to sustainability.

Ke 'Ike Hawaii offered entry points for learners of all backgrounds and experiences and encouraged connections by focusing on lenses of kuana'ike (perspective) and kuleana (responsibility/privilege). PBL benefits from curricular alignment as well as previous professional development efforts at Punahou. When discussing sustainability, participants were less likely to make explicit connections to their work, instead expressing confusion or a lack of confidence in their own understanding.

Recommendations

Based on these findings, the following recommendations are offered:

Recommendation one: consider alternative frameworks for talking about sustainability with faculty.

Even though participants demonstrated growth in sustainability competencies, they did not voice confidence in their own understanding of sustainability. While sustainability

competencies were an effective tool to demonstrate growth, they may not be the most effective construct to facilitate a common language around sustainability.

Recommendation two: decrease complexity by offering examples and choice

Successful projects were able to draw upon resources to reduce barriers to planning and implementation. Offering examples of projects of varying scope and complexity will encourage greater participation amongst faculty who are just beginning their journey of learning and teaching about sustainability.

Recommendation three: make connections explicit and build community

It is possible to support faculty's understanding of sustainability by building off of the great work that is already being done. Building connections within the classroom could help faculty better understand how their current teaching practices align with sustainability education goals. Showcasing successful projects within our community could help build community and connect interested faculty members. Finally, connecting projects across departments, centers, and programs across divisions could build a multi-layered community of sustainability education champions that can serve as resources for faculty looking to grow their own understanding of sustainability.

Organization Context

Punahou school is a large K-12 independent college preparatory school located in Honolulu, Hawaii. Each year, over 3,7000 students and almost 500 faculty and staff members come together to co-create a Punahou education. Organizationally, Punahou is divided into two divisions: the Junior School (K-8) and the Academy (9-12). The school has recently renewed its Mission and Values statements for the first time in 37 years. This comes on the heels of the president laying out five strategic initiatives to guide the growth of the school:

1. Inquiry-led, lifelong learning
2. Social, emotional, and ethical learning
3. Diversity, equity, inclusion, and belonging
4. Student safety and well-being
5. Sustainability

Action on strategic initiatives has afforded the creations of new roles and new programs. These new roles will have limited opportunity to advance programmatic goals, especially when professional development resources are divided amongst initiative stakeholders. All these new programs are seeking to infuse innovation into Punahou's rich tradition of academic excellence. The Sustainability Director, Debbie Millikan, is partnering with me because she is interested in better understanding how to navigate the complex system to advance sustainability goals at Punahou. This project was focused on identifying appropriate metrics to quantify progress in sustainability education. An opportunity to try out a measurement tool presented itself in the form of a transdisciplinary professional learning experience called Transforming A'o. Transforming A'o was designed to infuse inquiry-led learning and sustainability with Ke 'Ike Hawaii, or place-based indigenous wisdom to advance multiple strategic priorities synergistically.

Transforming A'o is an immersive, project-based training that allows faculty to explore connections with the 'aina (land) through a sustainability lens while generating a project-based learning (PBL) experience for students. Understanding the impact of this novel professional development experience will help us better understand how our community views this work and inform future iterations of Transforming A'o. This project will test the theory of advancing multiple strategic initiatives simultaneously through authentic, interdisciplinary learning experiences.

Problem of Practice

Sustainability education at Punahou, like many other strategic initiatives, vies for limited access to teachers and students across the K-12 campus. Sustainability education thrives in pockets on campus, but those efforts have limited opportunity to scale. Leadership shares a vision of sustainability at Punahou that is core to the student learning experience and central to the identity of the school. The challenge lies in bringing that shared vision to fruition. To quote Punahou's Sustainability Director Debbie Millikan, "we know where we want to go, we just aren't sure what's the best way to get there." There is a renewed interest in understanding the current state of sustainability education at Punahou to better understand "where are we now" and what's the surest path towards cementing sustainability's centrality to Punahou students' learning experience.

Complicating this challenge is the prevalence of similarly indispensable initiatives firmly ingrained in the heart of a Puanhou education. Two of these initiatives include inquiry-led learning as operationalized by Problem-Based Learning (PBL) and Ke 'Ike Hawaii, a program aimed at disseminating indigenous wisdom through a place-based approach to instructional design. At the behest of the president, these programs came together to offer an immersive learning experience for Punahou faculty called Transforming A'o. This professional

development was designed to help teachers understand the intersection of PBL, sustainability, and Ke 'Ike Hawaii.

Transforming A'o invites teachers to participate in a multi-day, project-based training on Reppun Farm. Participants are encouraged to explore the land, ponder questions of sustainability, and develop their own student-facing project using a PBL design. At the end of the learning experience, participants are invited to showcase their projects in a Transforming A'o exhibition. The goal of the training is to transform the way teachers think and teach about PBL, sustainability, and Ke 'Ike Hawaii. The training was offered to the entire campus, and a limited number of faculty applied. It's likely this faculty group represents a selective sample of highly-motivated early adapters and "true believers" when it comes to sustainability, inquiry-led learning, and/or Ke 'Ike Hawaii. At the end of the program, participants were encouraged to apply for grants which would provide paid training to become facilitators for the next round of Transforming A'o.

Halfway through the first training in January, Punahou's president, principals, and other top leadership members joined the Transforming A'o group to present the school's new mission statement and K-12 learning outcomes. This was the first internal audience for the new mission statement. The president emphasized that the transdisciplinary design of Transforming A'o aligns with the promise of the mission statement and the vision of the learning outcomes. He also pointed out that PBL offers a unique opportunity to navigate tensions of cohesion and autonomy by offering cohesion in the approach to myriad and diverse problems of interest amongst faculty (and eventually students). Finally, the president acknowledged that advancing multiple strategic priorities simultaneously necessitates unifying efforts to advance initiatives across the K-12 campus. Numerous stakeholders are hoping to scale this model of professional development offerings at Punahou. In order to iterate on the current design, it will be important to evaluate the

impact of the training, preferably in terms of learning experiences that teachers are able to create for students.

Review of Literature

Sustainability is a topic of increasing relevance and interest in the business community (Lans, 2014), educational organizations (Somerville and Williams, 2015), and organizations (Brundeirs et. al, 2021). A literature review has pointed to several models of sustainability, implications for sustainability education, and connections to problem-based learning, which shall be presented and synthesized below.

Even as interest in defining and developing sustainability in organizations has been on the rise, there are no clear-cut definitions that are applicable in all settings, which can lead to challenges in analyzing different approaches to sustainability (McFarlane & Gogazon, 2011; Green & Somerville 2015). Problems around sustainability “have no closed form and concern complex systems in which cause and effect are uncertain or unknown” (Lans 2014, p. 40). Because sustainability is inherently problem-based, it is best understood as a dynamic structure that is rooted in the local context (Wiek, Wythycombe, and Redman, 2011). Finally, the expansive time-horizon further complicates the construct, as “involvement of multiple stakeholders even includes future generations with unknown and, in principle, unknowable interests and values.” (Lans et. al., 2014). At Punahou, sustainability (as expressed by the Sustainability Director) marries many of these concepts, and can be seen as a complex, dynamic, locally-situated effort to care for the community over the next seven generations.

Sustainability Definition

As a construct in its “initial stages of defining distinct frameworks of sustainability research and problem solving” (Wiek, Wythycombe, and & Redman, 2011), several different definitions have been proffered, with the focus ranging from the individual to the systemic.

Facets of sustainability have been conceptualized to include mindset (Klinenberg & Rothberg, 2021), methodology (Moore, 2005), and a goal “to create an ecologically and socially just world within the means of nature without compromising future generations” (Moore, 2005). With such a range in lenses, it’s important to narrow down elements of a definition that apply to specific contexts.

Despite different models of sustainability, there is some agreement that sustainability should be thought of as transdisciplinary (Moore, 2005, Klinenberg & Rothberg, 2022), community-centered (Green & Somerville, 2015, Hermann & Bossle, 2020), and action-oriented (Ploum et. al, 2018, Lans et al. 2014, Cohen 2007). Each of these lenses lends to a comprehensive approach to sustainability that allows it to adopt meaning appropriate to the context. Transdisciplinary approaches “allow for sustainability to move from current rhetoric to reality” (Moore, 2005) by incorporating diverse viewpoints and promoting novel approaches to analyzing problems. A focus on building community creates “social ecology of place that underpins sustainability education practice” (Green and Somervill, 2008). Action competencies include “the ability to actively involve oneself in responsible actions to improve the sustainability of social–ecological systems in general and products, processes and procedures in particular (de Haan, 2006)” (Ploum et. al, p. 2018). Punahou’s approach to sustainability aligns with an action-oriented, community-based, transdisciplinary approach.

Sustainability Education

Sustainability as a goal is increasingly important to schools and universities (Brudiers et. al, 2002, Moore 2005, Herman & Bossle, 2020, Somerville & Williams, 2015). Regardless of the exact definition of sustainability, education is imperative to prepare future generations to tackle complex, “wicked problems” (Lans et. al, 2014).

Big problems require agile thinkers, and sustainability education programs have attempted to identify and assess the competencies required to tackle sustainability problems. Many programs rely on constructivist theories of knowledge and seek to create transformative learning experiences for students (Wiek, Withycombe, Redman, 2011).

Sustainability education research benefits from diverse efforts across a wide range of institutions. However, “the diversity and complexity of organizations and service types, structures, qualification regimes and governance arrangements, mak[e] it difficult to develop a coherent approach” (Somerville & Williams, 2015). Nonetheless, it is possible to learn from a variety of sustainability education programs to explore theoretical frameworks and glean relevant recommendations and barriers. In a longitudinal study, Olsson et al. (2022) found that ongoing professional development for teachers can improve sustainability action competencies in students.

Theoretical Framework

Somerville and Williams (2015) conducted a literature review of sustainability education and found "three major categories of theoretical orientation [...] identified as: Connection to nature; Children's rights; and Post-human frameworks" (p. 102). Of these theoretical frameworks, Punahou's approach to sustainability most closely aligns with the “children's rights” orientation, as it puts “focus on the intertwined social, cultural and economic global issues of sustainable development” (Somerville & Williams, 2015 p. 109). Another important theoretical framework to identify is the approach to systems thinking that aligns with Punahou values. Cordoba identified “three broad approaches to systems thinking: functionalist, interpretive, and complex adaptive systems (CAS)” (p. 323). Of these approaches, the interpretive is most in alignment with Punahou's values: “a primary aim of interpretive inquiry is to better understand the mental models and meaning-making systems of embedded actors, ... and

the ways in which they combine to create a shared reality” (Cordoba, 2009, p. 333). Throughout this evaluation, we will be viewing sustainability education through a children’s rights lens and interpreting systems thinking competencies through an interpretive approach.

Recommendations for Sustainability Education

Within the sustainability education literature, common themes and recommendations continue to resurface. Moore (2005) recommends sustainability education programs be designed with “more emphasis on transdisciplinary research and teaching, collaborative and transformative learning, and creating structures that incorporate participatory evaluation” (p. 551). Likewise, Shriberg (2002) insisted that sustainability curricula “must include active learning about the home institution as well as larger ecological and social issues” (p. 164) with a focus on supporting “sustainable operations, research and service” (p. 164). It is insufficient to merely articulate and design a transdisciplinary, transformative sustainability education program rooted in its home context that also manages to encompass global and social issues. In order for students to benefit, schools need to “offer faculty development programs and to build a shared literacy around key competencies in sustainability” (Brundiers et al., 2021, p. 26). The training program that is the subject of this formative evaluation offers an opportunity to learn from the community and to build a basis for shared understanding amongst participating faculty.

Sustainability Competencies

There are different models of sustainability competencies that have various levels of overlap. Cohen (2007) proposed a sustainability mindset construct comprising the following competencies: systems thinkers, academic and practical grounding, and ethically motivated. Brundiers, Wiek and Redman (2010) provide a simplified model, which clusters competencies around domains of “1) strategic knowledge 2) practical knowledge 3) collaborative cluster” (p. 310). Ploum et al. (2018) reviewed a number of studies and validated four competencies:

“systems thinking competence, foresighted thinking competence (or anticipatory competence), normative competence, and interpersonal competence.” It’s important to note that Ploum et al. (2018) challenged the practicality of an action competence: “ In the literature this competence is widely considered as one of the most important competencies for sustainable development (Blok, Gremmen, & Wesselink, 2015; de Haan, 2006; Ellis & Weekes, 2008), but in practice this does not always show” (p. 117).

Lans et al. (2014) offers a compelling model for competencies designed to align entrepreneurial competencies and sustainability competencies. The resulting survey tool is uniquely positioned to capture sustainability competencies that are likely to drive future action.

Lans et. al. (2014) identified seven sustainability competencies:

1. Systems-thinking competence (STC)
2. Embracing diversity and interdisciplinarity competence (EDI)
3. Foresighted thinking competence (FC)
4. Normative competence (NC)
5. Action competence (AC)
6. Interpersonal competence (IC)
7. Strategic management competence (SMC)

Lans et al. (2014) considers the potential questions that this tool could help to answer: “to what extent these competencies can be developed and, if so, whether the different sustainable entrepreneurship competencies should be treated equally in higher education. In order to answer the former question, the framework could be used to monitor competence development over time” (p. 45). As an assessment measure, Lans et al. (2014) assert that competencies are desirable because they “enable successful task performance and problem solving with respect to

real-world problems, challenges and opportunities” (p. 45). Ultimately, this iteration of sustainability competencies were adapted as the main means of assessing sustainability growth.

Connection to Project-Based Learning

One of the main benefits of this particular tool is its development as a synthesis of entrepreneurial and sustainability competencies. According to Brundiers, Wiek, and Redman (2010), there is a natural overlap between sustainability and project-based learning, which has “a focus on real-world problems, and they expose students to the corresponding real-world settings in communities, businesses, and governments” (p. 311). These authentic learning opportunities are designed to increase student motivation (Spiteri, 2010) by allowing students to produce a project that is meaningful to them. Finally, project-based learning is better suited for teaching students the competencies necessary “to tackle complex problems and confront interactions between different subjects” (Hermann & Bossle 2020, p. 31).

Future Directions in Sustainability Education

Some key future directions pointed out in the literature include the need for developing agreed-upon competencies (Brudiers et. al, 2021), design sustainability education programs with stakeholders in mind (Hermann & Bossle, 2020), and ensure that ethics is a key feature of sustainability education (Moore, 2005). These considerations will be included in the design of this evaluation study to ensure that training program elements are considered in future iterations of the training program.

Project Questions

This investigation is rooted in social constructivism, as many key concepts will be generated by the community in partnership with various stakeholders across campus. Sustainability competencies, as conceptualized in Lans et al. (2014), will form the basis for close-ended pre- and post- survey design to understand whether Transforming A'o has a

measurable impact on validated sustainability competencies. To better understand the impact of individual training elements, focus groups were convened to record participant reflections during the training, and several months after the training concluded. Finally, participants' project descriptions were analyzed to triangulate results found in survey and interview analysis. These artifact analysis may be overlaid to reveal the intersection of important initiatives in the learning experiences that Punahou teachers have created for Punahou students across a diverse and complex K-12 campus. Driving this investigation are three primary questions:

- 1) What impact does Transforming A'o training have on participant sustainability competencies?
- 2) How do participants value distinct elements of Transforming A'o training?
- 3) What connections do participants make between Ke 'Ike Hawaii, sustainability, and PBL after going through the training?

Project Design

To answer these investigation questions, the following data were collected. Data collection tools and validation data can be found in Appendices A-D.

1. Pre-training surveys (Q1, Appendix B)
2. Focus group interview (Q2, Appendix C)
3. Post-training surveys (Q1, Appendix B)
4. Follow-up interviews (Q2 & Q3, Appendix D)
5. Artifact analysis of project descriptions (Q1, Appendix A)

Question one is addressed using a pre- and post- training survey adapted from on Lans et al. (2014). The survey questions were reviewed together with the Sustainability Director to ensure that every question is relevant to our community. Any alterations in wording were cross-referenced with competency descriptions to ensure that the survey item held true to the

competency it was meant to elucidate. Artifact analysis of project descriptions for evidence of sustainability competencies will corroborate survey results.

To address question two, Transforming A'o designers co-designed question wordings and verified the specific elements of the training to be evaluated. To capture the intended impact, participants were asked to identify what aspects of each element were “transformational, impactful, or memorable”. These terms were operationally defined at the start of the focus group. Participants consistently adhered to those labels when identifying experiences that shaped their experience of the training. By capturing participant feedback during the training as well as several months later, it is possible to track participant's views of the training over time.

Question three is possible to answer directly through some of the statements participants gave in focus groups as well as follow-up interviews. Another approach will include systematic analysis of project descriptions to identify aspects of the project description that refer to sustainability competencies, PBL components, and Ke 'Ike Hawaii mindsets.

Research Questions

There are three main questions driving this project:

- 1) What impact does Transforming A'o training have on participant sustainability competencies?
- 2) How do participants value distinct elements of Transforming A'o training?
- 3) What connections do participants make between Ke 'Ike Hawai'i, sustainability, and PBL after going through the training?

In order to answer the above questions, the following data sources were collected and analyzed:

- 1) Pre-post surveys measuring sustainability competencies
- 2) Focus group interview conducted after the first day of Transforming A'o
- 3) Follow-up interviews (5- months post)

- 4) Project descriptions (authentic artifact of completing the PBL process)

Instrument Development

Surveys were adapted from Lans et al. (2014) and can be found in Appendix B. The measure was selected because it is a ready-made tool with reliability data available. It was also developed in an interdisciplinary context to measure sustainability competencies in entrepreneurship students at the undergraduate level. In both the foundational research and this context, the assumption is that participants will be able to translate sustainability competencies to their day-to-day work, which has the potential to impact a broader community, either through entrepreneurship or education.

Focus group and follow-up interview questions were co-developed in a series of conversations with Transforming A'o designers. To best understand the impact of various elements, we wanted to frame questions in the language most relevant to the goal of the program: transforming knowledge. In collaboration with designers, we decided to ask whether specific experiences were likely to be memorable (stick with you), impactful (change your actions), or transformative (change your perspective). Detailed operational definitions were provided at the outset of the interviews and offered whenever clarification was requested. Initial analysis of focus group data led us to explore themes of community, affordances, and barriers in 5 month follow-up interviews.

Sustainability competency rubrics used in document analysis and interview analysis were developed based on Lans et al. (2014). Detailed competency descriptors were essentialized into key words (see Appendix A). Whenever key words were identified in the project descriptions or transcripts, I would read through the surrounding text to judge whether the context supported coding for a particular competency. A second pass-through looked carefully for synonyms or

other expressions of the sustainability competencies that did not use any of the key words directly.

Document analysis looked for evidence of sustainability competencies within the project descriptions to corroborate survey and interview findings. Based on preliminary analysis of survey results, it seemed there might be other ways to observe the sustainability experiences, even if participants were not actively using the language of sustainability competencies in interviews. Whenever I uncovered evidence of a specific sustainability competency, I would revisit the definition to determine if the context justifies coding that aspect of the project as a specific sustainability competency.

Recruitment

Participants in this study represent a small and self-selected slice of the Punahou faculty population. To be a part of Transforming A'o, participants opted-in to emails calling for volunteers to pilot an immersive, place-based overnight learning experience. From that pool of applicants, 31 participants across grade levels and departments were invited to take part in the learning experience. Prior to arriving at Reppun Farms, participants received an email invitation to complete the pre-survey. In that email, participants were informed about opportunities to contribute to this capstone project, including the focus group, follow-up interviews, and project description analysis. After several follow-up emails, a total of 26 faculty completed the pre-survey (including the design team). By the end of the data collection period, only 13 participants had filled out the post-survey (excluding the design team). While this level of attrition is not uncommon, it does contribute to the limitations of this exploration.

In the initial (pre) survey, people were asked if they'd be willing to participate in 1) a focus group during lunch of the second day and 2) a follow-up interview at the end of the semester. Twelve people indicated in the pre-survey that they would be interested in participating in the

initial focus group. A total of eight people actually participated in the focus group during lunch on the second day of the retreat. Eight people contributed follow-up interviews at the conclusion of the semester, roughly five months later. At the conclusion of the Transforming A'o experience, participants were encouraged to share their completed project descriptions to a shared folder in Google Drive. These project descriptions were analyzed to corroborate and triangulate findings from the focus group and follow-up interviews.

Data Collection

Surveys were sent out to participants two weeks prior to the learning experience. Three email reminders were sent, the final one the day before the event. Immediately prior to the focus group, I arrived at the training site to observe a collaborative work period as participants engaged in an initial project planning activity. Just before the group broke for lunch, designers introduced me to the group and I extended a verbal invitation to participate in a focus group on-site. Eight participants loaded up their plates with food co-prepared by the group and participated in an anonymous, recorded, and transcribed conversation. This conversation took place a significant distance away from the designers and other participants, to encourage confidence of anonymity.

Follow-up interviews were originally intended to be another focus group format. However, initial planning stages suggested that reaching the broadest group of respondents required offering multiple opportunities for drop-in interviews. Only two participants overlapped in their responses, and both eagerly consented to sharing their responses with each other. Interviews were recorded, anonymized, and transcribed for analysis.

Data Analysis

Survey Results

To understand group differences in sustainability competencies pre- vs. post- training, I measured the mean response score across participants for each competency. This was done for pre-training scores as well as post-training scores. I then calculated the difference of means for each competency (post minus pre). After calculating standard deviation, I ran a two-tailed t-test to identify competencies that seemed to show improvement from the pre-survey to the post-survey.

Interview Analysis

Transcription and Memoing

Each recorded interview was transcribed using Otter.ai tools. For all interviews, I reviewed the recording the following day and filled in any gaps in my contemporaneous notes as recommended by Carl and Ravitch (2021). Each transcribed interview was analyzed on multiple pass throughs. I engaged in a practice of reflective memoing after each round of analysis.

Focus Group Interviews

The first pass-through coded responses for the key words of “memorable, impactful, or transformative.” This inductive coding layer helped to identify which elements had the greatest potential impact on participant’s practice. The second pass through identified key concepts or phrases that respondents gave as reasons for their categorization of the elements. This layer of deductive coding helped identify themes that shaped follow-up interview questions in collaboration with designers. The third pass through looked for sustainability competency keywords to better understand how, if at all, sustainability competencies can be found in participants’ underlying discourse. Appendix A shows a code table developed from competency descriptions.

Five-Month Follow-up Interviews

The first pass through identified community, affordances, barriers. The second pass through identified evidence of sustainability competencies keywords. Each participant was asked if they finished the project, what were barriers and affordances. To address research question number three, each participant was asked to make connections between Ke 'Ike Hawaii, PBL, and sustainability.

Artifact Analysis

To better understand the potential impact of sustainability competencies on teacher behavior, project descriptions were analyzed for evidence of sustainability competencies. This layer of analysis corroborated and triangulated sustainability competencies in the context of self-report, discourse, and finally, action.

Limitations

From the outset of this project, our sample group is selected from a small, disproportionately bought-in segment of the population. The vision and the work promised by Transforming A'o called to a group of individuals across campus to give up their weekend to participate in an overnight learning experience on a farm located on the opposite side of the island. This is a group with experience and passion for sustainability, PBL, and Ke 'Ike Hawaii. In many senses, these participants would be the leaders of spreading this work across campus. While their responses do not represent those of the greater whole, they do shed light on how those who are most clued into these fields see their work in relation to the broader Punahou community as a whole.

Findings

Finding One: Participant Sustainability Competencies Increased After Participation in Transforming A'o Training

It appears that five out of the seven competencies showed statistically significant improvement ($p < 0.05$) from pretest to post-test. These competencies included Strategic Management (SMC), Action (AC), Embracing Diversity and Interdisciplinarity (EDI), Systems Thinking (STC), and Normative (NC). The two competencies that showed less significant growth between pre-survey and post-survey ($p < 0.10$) included Foresighted Thinking (FT) and Interpersonal (IC). The table below shows the difference in means from pretest to post-test. Green cells show significant T-test results ($p < 0.05$).

Table 1

Means Analysis of Sustainability Competencies Pre-training vs. Post-training

	SMC	AC	EDI	STC	NC	FT	IC
Mean (Pre)	20.62	24.85	20.08	20.31	24.31	23.46	23.23
Mean (Post)	26.92	31.08	29.62	26.00	29.69	28.38	24.77
Difference	6.31	6.23	9.54	5.69	5.38	4.92	1.54
T-Test	0.036	0.007	0.001	0.038	0.029	0.055	0.059

Another view of this data allowed us to document which competencies are most highly rated by respondents. In the post-training survey, Action Competency scored as the highest rated competency. Embracing Diversity and Interdisciplinarity was the competency that demonstrated the largest growth between the two surveys. The yellow highlighted cells represent the highest rated competency (AC) and the competency with the greatest gains (EDI).

Document analysis supported the self-report survey results. Evidence of sustainability competencies could be found in each of the project descriptions. However, during interviews, participants did not voice confidence in their ability to demonstrate these competencies in their

personal or professional lives. One participant voiced frustration over the lack of a clear definition: "Even the use of the word sustainable, it felt like it was bouncing all over the place... but I'm more confused ...". Other participants felt like Transforming A'o did not offer enough scaffolding to support implementation of sustainability learning: "I really was hoping to get more of the sustainability piece into action."

Finding Two: Participants Valued Elements of Transforming A'o that Developed Community and Decreased Complexity

The various elements of Transforming A'o resonated with participants in different ways, depending on their background knowledge and experience. Some felt there was little they could take away from the Transforming A'o experience because "I already have so much training." Others found new and challenging things to be profoundly impactful and enjoyed elements of learning together: "we're both exploring beyond that adventure together." Common themes stood out amongst focus group answers. Elements were more likely to be rated as impactful if they served to develop community, decrease complexity, and/ or help people make connections for themselves. Each theme is outlined in more detail below.

Finding 2a: Participants Valued Experiences that Developed Community

Participants enjoyed learning about each other, meeting people in different divisions, and connecting with colleagues in new and surprising ways. As one participant put it: "The places where the conversations are the most electric is when we're talking together." One participant's comments highlighted the power of community in taking on challenging, transformative work:

"... as we look at faculty growth, it's just making me wonder if we have the capacity to connect cohorts of people through a common experience like this, where we first start grounded together in a way that's very personal. So that when you go to do the

professional work, there's a safety in that ... you're bound to find someone else in a K to twelve group that you can somehow connect with.”

Others credited the feeling of community with allowing them to “go further with my thinking” or “ascend to the next level of like grounding ourselves in the space and with each other.” The transformative potential of this community extends beyond relationships between faculty: “And so that's a reminder for me as a teacher to slow down and make sure people feel at home before they are willing to do things like intellectual risk taking.”

The elements that most engendered feelings of community included preparing and eating meals together and the empathy interviews. Specifically, eating meals together set the tone for the learning experience. One participant described it as a feeling of “family coming together to create something new here.” Another described the transformative impact of sharing meals with colleagues: “I need to remember that I need to remember that that opportunity exists for me every time I'm eating lunch and to not squander that.” The empathy interviews highlighted interdisciplinary aspects of Transforming A'o compared to the siloed experience of day-to-day teaching in separate subject matters: “we're all interacting with each other to design and create ... and we're all building off of each other.” This cross-divisional interdisciplinary collaboration resulted in a meeting of the minds where “all of these things interconnected to design these amazing, incredible things.”

Finding 2b: Decreasing Complexity was a Key Step in Developing Successful Projects

Participants were keenly aware of the challenge of integrating PBL, sustainability, and Ke 'Ike Hawaii into one immersive learning experience. The Thinking Maps activity offered concrete examples and step-by-step tools that participants felt they could use in the classroom. Participants endorsed this activity as a concrete tool that helped make the final project more accessible. While the activity was generally endorsed as impactful, participants craved more

concrete examples and scaffolding. One participant articulated a desire for “more scaffolding ... let us walk through something collaborative together. And then later on, I can go back and do something on my own.” It was generally agreed upon that a few more examples would make it easier for participants to make connections between the examples and their own projects.

There was some debate amongst the group as to whether the activity could function better as a collaborative or individual activity. Ultimately, the group agreed that choice during independent work time would be ideal. People seeking collaboration and feedback could find each other while those who were eager to dive into the work could find the space to do so.

In the five-month follow-up interviews, participants were asked whether they were able to complete their projects, and if not, if they were on track to implementing their projects at some point in the future. Every respondent who reported being on track with their project had expressed some way in which they were able to decrease complexity. Some had adjusted the scope from a semester-long project to a unit-long project. Another strategy was waiting to implement the project at a time when other grade-level teachers would be able to participate, distributing the workload and increasing the impact on students. Finally, some respondents cited coaching and other follow-up resources connecting faculty to Transforming A'o designers as a vital resource to translate vision and intention into action.

Finding Three: Participants made connections between Ke 'Ike Hawaii, PBL, and their Workspaces, but they were less likely to report connections to sustainability.

Many participants voiced the power of urging all people who choose to live in Hawaii to learn about its past and bring that wisdom forward to future generations. This place-based lens was seen as the glue that binds us all. Regardless of background, heritage, or perspective, all participants could see themselves as residents of O'ahu, who have been called to work at this place called Ka Punahou, “the new spring”. The freshwater spring bubbling up underneath the

chapel at the center of campus serves as a physical reminder of our kuleana (responsibility, privilege) and functions as a gathering place for both formal and informal meetings.

One distinct success of Ke' Ike Hawaii was finding ways for people to connect through the lenses of kuana'ike (perspective) and kuleana (responsibility, privilege) to their projects and curriculum. Regardless of background, participants were able to verbalize the importance and relevance of Ke 'Ike Hawaii by grounding that learning in place. The opening Po'ai, or introductory chant, "really helped me understand and help me feel like I knew where I was." Participants were also able to identify different entry points for engagement with Ke 'Ike Hawaii, suitable to a diversity of background knowledge and experience. One participant who self-identified as a learner in this space reflected "it's not about me becoming Hawaiian, it's about me accepting the responsibility of the choice I made when I made Hawaii home." In response, another teacher shared: "that's an essential part of investing in any community and being a part of anything, whether it's Punahou or where you live." The theme of place served as a unifying factor, and allowed for a grounding of Transforming A'o work in the shared experience of time and place.

PBL resonated with Punahou's vision of inquiry-led learning. Practitioners of Hawaiian cultural knowledge pointed out how in Hawaiian culture, learning involves doing: "the way Hawaiian pedagogy works is ... you don't just read about it ... you bring kids to the lo'i (field) and you do this with them." The action-oriented elements of PBL gave teachers energy; many expressed eagerness to see students "try this learning out". Regardless of subject matter, participants reported confidence in their ability to design a lesson in alignment with PBL components. Familiarity with PBL was often cited as an affordance for participants in follow-up interviews. Various departments had undergone several iterations of inquiry-based or experiential learning professional development in prior years. New faculty tended to have some

experience either directly with PBL or similar teaching philosophies. PBL was seen as an authentic vessel to deliver content. As such, participants explicitly endorsed alignment between PBL, Ke 'Ike Hawaii, and their curriculum.

Sustainability was an outlier in its lack of explicit connection between the other goals of Transforming A'o. Participants often voiced confusion or a lack of familiarity with sustainability. One participant voiced enthusiasm and confusion surrounding the definition of sustainability: "The only piece that felt really new that I was excited about was the sustainability, that mapping and again, there was just the one example of it, which I loved. But then I felt like it jumped to something else so quickly that I didn't understand how to take that and use another example." Participants noted various places on campus where sustainability education occurs, including the 7th grade social studies curriculum, some K-1 classrooms, and Design Technology and Engineering (DTE) programs.

Even though sustainability was not clearly evident in participant's verbal responses, content analysis demonstrated connections, especially in the Action (AC) and Normative (NC) Competencies. This finding corroborates question 1, demonstrating it is possible to measure an impact on sustainability competencies, even if participants are not explicitly endorsing connections between sustainability and PBL or Ke 'Ike Hawaii.

Recommendations

In order to support growth in sustainability education across the K-12 campus, the following recommendations will call upon the strengths of the community, while drawing upon lessons from qualitative analysis to improve accessibility for faculty and increase connections across campus.

Recommendation One: Consider Alternative Frameworks for Talking about Sustainability with Faculty.

While sustainability competencies were an effective framework to identify growth and evidence in practice, participants did not express confidence with the construct. It's possible that the seven different competencies served to complexify, rather than simplify the construct of sustainability. In an already complex environment, Punahou faculty have expressed a desire for a simple definition of sustainability that allows for more entry points, regardless of prior background and experience. Drawing on lessons from Ke 'Ike Hawaii, it is possible to increase accessibility for faculty by providing targeted frames (such as Kuana'ike and Kuleana) and a specific hook to draw people in ("we all have chosen to live here").

While it is beyond the scope of this project to recommend a specific alternative framework, something like the Cloud Institute's Education for Sustainability (EfS) or Rimanoczy's (2019) Sustainability Mindsets might better offer multiple entry points, align better with existing sustainability efforts on campus, and allow for better integration with existing curricula. Most importantly, instead of couching sustainability education within a competency model, EfS and Sustainability Mindsets rely upon principles or content standards, which can be advanced independently of each other. This piecemeal approach should allow for more entry points for Punahou faculty and present better opportunities to align sustainability education with other strategic priorities.

With a new sustainability framework, it will be important to continue to measure individual and systemic progress towards sustainability education goals. This capstone project has determined that research-validated self-report tools can capture growth in sustainability competencies as a result of a professional development experience. It is also possible to review artifacts, such as project descriptions or other lesson-planning tools to identify sustainability education elements, even if faculty are not explicitly endorsing those concepts as affecting their

work. An area for improvement is to encourage a shared language around sustainability education across the K-12 campus.

Recommendation Two: Decrease Complexity By Offering Examples and Choice

Punahou is a complex organization, and faculty feel pulled in many different directions simultaneously. Recommendation one is aimed at making the concept of sustainability education more accessible to faculty. Recommendation two is aimed at ensuring that framework is accessible to all faculty learners. A lesson can be drawn from Ke 'Ike Hawaii, which invites learners of all backgrounds and knowledge levels to recognize their choice to “choose to live in this place, [the] obligation to know about it, [and] teach others”. This hook was reiterated by multiple participants at various points along their journey in understanding Ke 'Ike Hawaii. The effect gave people a shorthand way to understand Ke 'Ike Hawaii and how it can be relevant in their personal and professional lives. A simple hook can be a powerful tool in inviting learners to engage with new learning with students. Decreasing complexity invites faculty to model to students what it means to be a learner in this space. By decreasing barriers to entry, more faculty would feel comfortable engaging in sustainability education, and may be able to better communicate their work.

Whenever possible sustainability training opportunities should incorporate concrete examples and specific applications. The Sustainability Scavenger Hunt feedback demonstrated the power of interdisciplinarity to ignite teacher enthusiasm. However, examples should cover significantly more variability in terms of collaboration. Cross-departmental and cross-divisional work is rare at Punahou, and very frequently, the collaboration is well-received.

Introducing choice by providing exemplars that range from bare-minimum to ambitious will help faculty connect their vision to successful work that has already been done at Punahou. People can self-assess their comfort level and emulate the level of complexity most applicable to

their projects. Interdisciplinary collaboration is inherently complex work that requires common planning time and a common language. This can present as a barrier to many faculty who feel that time is their biggest constraint. Highlighting simple successes across campus is a great way to encourage faculty to take baby steps with their students as they expand their sustainability horizons. Providing examples of a range of projects will allow ambitious people to stretch their limits while also encouraging those who are less familiar to take on small-scale, simple projects that are more likely to expose students to sustainability education.

Recommendation Three: Make Connections Explicit and Build Community

Transforming A'o has had the explicit goal of helping faculty make connections between sustainability, PBL, and Ke 'Ike Hawaii. Evidence for connections between PBL, Ke 'Ike Hawaii, and participant's day-to-day work are apparent throughout interview transcripts. Despite evidence of sustainability growth via self-report measures and evidence of sustainability competencies within project descriptions, participants don't feel confident in their own learning in the area of sustainability. Making connections explicit for faculty will help them to identify where this work is already happening in their classrooms, amongst their colleagues, and hopefully across campus. Suggestions for how to make connections at various levels are detailed below.

Build Connections Within the Classroom

It was possible to observe sustainability competencies within project descriptions. Teachers may benefit from feedback highlighting which aspects of their projects align with specific sustainability competencies. With a new framework, it might be helpful to develop individual faculty understanding through classroom observations or lesson plan reviews. This could be a way for the Sustainability Director to invite faculty to understand some of the work they are already doing as being in alignment with sustainability education. By highlighting

strengths within the community, a shared language can develop organically by empowering teachers to name the things they do to promote sustainability education at Punahou. A good starting point might be the teachers who attended Transforming A'o, as there is likely to be buy-in and interest. Validating current sustainability education efforts across campus would also likely increase teacher effort to continue along their learning journey.

Build Connections Amongst Faculty

As teachers learn about aspects of their practice that align with sustainability education, they are armed with the vocabulary to share their successes with colleagues. Participants have identified learning from colleagues as a preferred means of advancing their own understanding. They have also expressed a preference for learning about sustainability in community. By highlighting the great work that is already happening across campus, it allows teachers to see concrete examples that work with Punahou students. This can serve to reduce barriers of complexity for faculty with low confidence in their own ability to create sustainability lessons from scratch. Highlighting Punahou examples of sustainability education allows for others to see how it can be done and provides them with trusted resources in the form of colleagues who have had success with implementing sustainability education at Punahou. Inviting people to witness sustainability education in action makes that work visible to the broader community and has the potential to draw in faculty who are interested, but unsure of their own abilities.

Build Connections Across Divisions and Departments

It is possible to reduce barriers to implementing sustainability education projects by connecting interested faculty with resources available on campus. Some projects will align neatly with the unique strengths of different centers on campus, including Design, Technology and Engineering (DTE) or Case Accelerator for Student Entrepreneurship (CASE). Aligning teacher efforts with center resources and expertise can amplify the work of individual teachers to connect

sustainability education to the curriculum. Other projects may fit neatly within departmental or divisional priorities. Starting with Transforming A'o project descriptions, the Sustainability Director could begin to map out where this work is happening across campus and connect teachers with resources or partners who can share some of the burden of planning and implementing these projects. Examples of natural partners could include AP Environmental Studies, the Case Accelerator for Student Entrepreneurship, the Design, Technology, and Engineering (DTE) department, 7th grade Social Studies, and specific projects within the K-1 community. These relationships could expand the current practices and allow the work of sustainability education to be more evenly distributed across campus.

Conclusion

In conclusion, this project has demonstrated that it is possible to measure growth in sustainability competencies over time based on research-validated self-report measures. In addition, it is possible to find evidence of sustainability competencies in interview responses and project descriptions, even if participants aren't explicitly endorsing confidence with the constructs. Even so, participants were not as likely to report connections between sustainability compared with PBL or Ke 'Ike Hawaii. This suggests that the impact of Transforming A'o learning experience on sustainability education might be less likely to translate into long-term changes in teaching practices.

Based on participant responses to focus groups and interviews, elements of Transforming A'o resonated with participants when they developed community or decreased complexity. Participants consistently reported connections between their work and PBL or Ke 'Ike Hawaii, but were less likely to explicitly link sustainability to their day-to-day work. In order to bolster current sustainability education efforts at Punahou, recommendations are offered below.

Recommendations for sustainability education at Punahou include 1) rethinking sustainability by creating more entry points and designing for curricular alignment. 2) Providing value by developing a community of sustainability educators and decreasing complexity, whenever possible. 3) Creating strategic partnerships amongst faculty, across divisions, and in partnership with centers could help faculty share the load and help faculty make connections across campus and beyond.

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Appendix A

Sustainability competency definitions from Lans et. al (2014), pages 40-41.

STC: Systems thinking competence: the ability to identify and analyse all relevant (sub)systems across different domains (people, planet, profit) and disciplines, including their boundaries. Systems thinking competence is the ability to understand and reflect upon the interdependency of these (sub)systems, including cascading effects, inertia, feedback loops and accompanying cultures (Wiek et al., 2011).

EDI: Embracing diversity and interdisciplinarity competence: the ability to structure relationships, spot issues, and recognise the legitimacy of other viewpoints in business decision making processes; be it about environmental, social and/or economic issues. It is the ability to involve all stakeholders and to maximise the exchange of ideas and learning across different groups (inside and outside the organisation) and different disciplines (De Haan, 2010; Ellis and Weekes, 2008; Wilson et al., 2006).

FT: Foresighted thinking competence: the ability to collectively analyse, evaluate, and craft “pictures” of the future in which the impact of local and/or short term decisions on environmental, social and economic issues is viewed on a global/cosmopolitan scale and in the long term (Wiek et al., 2011).

NC: Normative competence: the ability to map, apply and reconcile sustainability values, principles and targets (Wiek et al., 2011).

AC: Action competence: the ability to actively involve oneself in responsible actions for the improvement of the sustainability of social-ecological systems (De Haan, 2010; Mogensen and Schnack, 2010; Schnack, 1996).

IC: Interpersonal competence: the ability to motivate, enable, and facilitate collaborative and participatory sustainability activities and research (Wiek et al., 2011).

SMC: Strategic management competence: the ability to collectively design projects, implement interventions, transitions, and strategies for sustainable development practices. This domain involves skills in planning (e.g., design and implement interventions), organising (arranging tasks, people and other resources), leadership (inspiring and motivating people) and control (e.g., evaluating policies, programmes and action plans) (De Haan, 2010; Wiek et al., 2011).

Sustainability Competency Codebook for Transcript and Artifact Analysis

Competency	Abbreviation	Code Words
Systems thinking competence	STC	(sub)systems, interdependency
Embracing diversity and interdisciplinarity competence	EDI	structure relationships, other viewpoints, involve all stakeholders, maximise the exchange of ideas
Foresighted thinking competence:	FT	future, global/cosmopolitan scale, long term
Normative competence:	NC	values, principles and targets
Action competence:	AC	actively involve oneself
Interpersonal competence:	IC	motivate, collaborative and participatory
Strategic management competence	SMC	design, planning, organising, leadership, control

Table 2
Reliability scores of the original constructs.

Construct	Cronbach's alpha	Number of items
Systems thinking competence (STC)	0.85	6
Embracing diversity and interdisciplinarity (EDI)	0.87	4
Foresighted thinking (FTC)	0.72	6
Normative competence (NC)	0.83	7
Action competence (AC)	0.85	8
Interpersonal competence (IC)	0.71	6
Strategic management competence (SMC)	0.90	5
Entrepreneurial self-efficacy (ESE)	0.79	7

Competency reliability data from Lans et. al (2014)

Appendix B

Sustainability Competency Self-Report Survey (adapted from Lans et. al. 2014).

The survey below has been adapted to include the abbreviated sustainability competency corresponding to each question.

Survey Instructions:

On each of the following items, please rate your current performance on a scale of 1 (low) to 10 (high). These items are meant to be applicable across personal and professional contexts. If you are uncertain as to how the question applies to you, please consider the item as it relates to your professional context as a classroom teacher.

1. (SMC) When it comes to achieving particular goals in relation to sustainability, I know whom to involve.
2. (SMC) I am able to use a strategic way of working in sustainability related projects (designing, testing, implementing, evaluating).
3. (SMC) I am able to monitor the sustainability performance of a student project.
4. (SMC) If I want to reach goals in relation to sustainability, I know which steps should be taken to be successful.
5. (AC) I am very good at identifying opportunities for sustainable development.
6. (AC) I am able to motivate students to learn about sustainability
7. (AC) I know how social, environmental or societal challenges can be turned into opportunities for creating authentic learning experiences
8. (AC) I challenge non-sustainable ways of being in my personal and professional life
9. (EDI) I am able to actively involve stakeholders and experts from other disciplines in addressing sustainability issues.
10. (EDI) I use the experiences, activities and values of various relevant stakeholders in addressing sustainability issues.
11. (EDI) I am able to explain the importance of involving local stakeholders (e.g. in recruitment) for a project.
12. (EDI) I am able to identify economic, social and environmental conflicts of interest.
13. (STC) I am able to identify the key operations of a system that have a negative impact on the environment or society.
14. (STC) I am able to identify key aspects of production chains and agricultural eco-systems.
15. (STC) I am able to analyze strengths and weaknesses of systems and propose improvements to reduce the negative effects on the environment or society.
16. (FT) I am able to construct and consider different directions for sustainability in the future.
17. (FT) I am able to integrate social, environmental and societal issues into learning opportunities.

18. (NC) I am able to apply norms, values, targets and principles of sustainability to my own practice.
19. (NC) I know what is seen as 'good sustainable practice'.
20. (NC) I know how to explain the decisions an organization has made concerning sustainability.
21. (FT) In analyzing and evaluating scenarios for action, I take both the impact on the local and the global scale into consideration.
22. (FT) I am able to identify risks and opportunities inherent in present and future developments.
23. (FT) In analyzing and evaluating scenarios for action, I take the impact on the short as well as the long term into consideration.
24. (NC) I am willing to take initiative to make improvements in my own practice based on norms, values, targets and principles of sustainability.
25. (IC) In a personal conflict, I am able to take the others' perspective and really understand his or her point of view.
26. (IC) I am patient and sensitive to someone who "lets off steam" in complex issues.
27. (IC) I am able to feel to what extent stakeholders are willing to cooperate in a project.

Appendix C

Focus Group Protocol

Introduction (5 min):

Thank you so much for being willing to share your honest feedback in this focus group format. We're looking to better understand your thoughts/feelings/reactions to specific training elements in an open dialogue. Our hope is that your honest feedback could help us to improve this training for future iterations. We are recording this conversation, so please speak up. Your words will be transcribed and anonymized so that no individual will be associated with any particular statement. I hope that you will feel free to share your honest perspective, even if it is negative.

The goal is for these questions to generate discussion across the table so that we can capture a wide range of perspectives. Feel free to talk to each other and not just to me. There may be disagreement at this table, and I would encourage you to speak to your own experience, even if it differs from something someone else just shared. We will honor each others' truths, as that's the best way we can learn how this training can impact our diverse Punahou community.

For the first question, I will be asking about specific training elements. I'm going to ask you to share what you found memorable, impactful, or transformative about each training element. For the purposes of our conversation I'd like to offer the following operational definitions:

- **Memorable:** Something you think will stick with you, even if no further action is taken.
- **Impactful:** Something that you would like to take back to your classroom or may act upon in the future.
- **Transformative:** Something that has the power to change the way you teach or makes you think about things in a new way.

Did you find ___ memorable, impactful, or transformative? Why or why not? (~30 min)

[For each question, let participants talk for ~5 min. Try to encourage everyone to share something. If met with silence or resistance to the question framing, go to follow-up questions. At the end of the 5 mins, offer a brief summary and ask what was missed]

- Preparing and eating meals together (5 min)
- Po'ai - opening, closing (5 min)
- Empathy Interview (5 min)
- Sustainability Scavenger Hunt (5 min)
- Thinking Maps activities (5 min)

Follow-up/ probing questions: Was [specific element] useful? How? Why? Was it a good use of time? What would you change about it?

In what you shared, what connections can you make between Ke 'Ike Hawaii, sustainability, and PBL? (10 min)

Follow-up/ probing questions: How do the specific elements make sense together? Are there any elements that feel out of place or do not belong?

What would you change about the training? Why? (10 min)

Closing (5 min):

Thank you so much for sharing your kuana'ike in this focus group format. It's been so helpful to hear your experiences with the training elements and how they all fit together. We're going to take these recordings, transcribe them, and anonymize those transcripts so that our analysis can capture the spirit of what was shared without tying specific statements to any specific individual. We will be conducting another round of focus groups later on in the semester. Those of you who have indicated interest in participating in those focus groups will receive communication when that time is nearer. Many thanks and I hope that the rest of your training goes well!

Transforming A'o Training Elements:

- Preparing and eating meals together (5 min)
- Po'ai - opening, closing (5 min)
- Empathy Interview (5 min)
- Sustainability Scavenger Hunt (5 min)
- Thinking Maps activities (5 min)

In what you shared, what connections can you make between Ke 'Ike Hawaii, sustainability, and PBL? (10 min)

What would you change about the training? Why? (10 min)

Appendix D

Follow-up Interview Questions

Introduction (5 min):

Thank you so much for being willing to share your honest feedback in this focus group format. Our hope is that your honest feedback could help us to improve this training for future iterations. We are recording this conversation, so please speak up. Your words will be transcribed and anonymized so that no individual will be associated with any particular statement. I hope that you will feel free to share your honest perspective, even if it is negative.

1. Have you had a chance to implement your project? How'd it go?
 - Follow up prompts:
 - Yes- Did it work as you planned? What surprises did you encounter? Are you planning on implementing it in the future?
 - No- Why not? Did you hope to implement it this semester? Are you planning on implementing in the future?
2. Have you been able to apply any of the learning from the training? How'd it go?
 - Follow-up prompts: What grade levels? What content areas? Where did lessons take place? Did you partner with anyone else? Do you plan to?
3. What's getting in the way? (barriers)
 - Follow-up prompts: Planning time? Competing priorities? Lack of resources? Lack of partners? Crowded curricula?
4. What resources would help you connect Ke 'Ike Hawaii, sustainability, and PBL?
 - Follow-up prompts: More time with on-campus experts? Collaboration with outside partners? More training?
5. Where else is this work happening across campus? (snowball sampling)
 - Follow-up prompts: Other teachers or colleagues doing this work? What grade levels? How did you learn of their work? Have you collaborated with them?